CLAIMS

We claim:

1. A method of specifying routes for a group of nets, the method comprising:

    a) specifying a total cost;

    b) performing a first depth-first search to identify, for the group of nets, a complete routing solution that has a cost that does not exceed the total cost, wherein a routing solution for a set of nets includes a route for each net in the set;

    c) if the search cannot find the complete routing solution, incrementing the total cost and performing a second depth-first search to identify a complete routing solution for the group of nets that has a cost that does not exceed the incremented total cost.

2. The method of claim 1, wherein performing a first depth-first search comprises:

    a) identifying a first set of routes for a first net in the group, wherein each route has a cost;

    b) individually examining the first-set routes until the complete routing solution is identified or until all first-set routes have been examined without identifying the complete routing solution;

    c) wherein individually examining a particular first-set route includes determining whether, in the region with the particular first-set route embedded, a first partial routing solution for the nets other than the first net exists such that the cost of the particular first-

set route plus the first partial solution does not exceed the total cost.

3.   The method of claim 2 further comprising:

wherein when the method determines that a first partial routing solution exists while examining a particular first-set route, identifying the particular first-set route and the routes of the first partial routing solution as the complete routing solution.

4.   The method of claim 3, wherein determining whether a first partial routing solution exists in the region with the particular first-set route embedded comprises:

a)   in the region with the particular first-set route embedded, identifying a second set of routes for a second net in the group;

b)   individually examining the second-set routes until the complete routing solution is identified or until all second-set routes have been examined without identifying the complete routing solution;

c)   wherein individually examining a particular second-set route includes determining whether, in the region with the particular first-set route and the particular second-set route embedded, a second partial routing solution for the nets other than the first and second nets exists such that the cost of the particular first-set and second-set routes plus the second partial solution does not exceed the total cost.

5.   The method of claim 4 further comprising:

when no second partial routing solution exists for any second-set route, examining another first-set route.

6. The method of claim 2, wherein individually examining the first-set routes comprises individually examining the first-set routes until the complete routing solution is identified or until all first-set routes have been examined without identifying the complete routing solution or a until particular number of routes have been examined.

7. The method of claim 2, wherein the first-set routes are examined in a particular order.

8. The method of claim 7, wherein the order is based on the cost of the routes.

9. The method of claim 7 further comprising:

ordering the nets before performing the depth-first search the first time.

10. The method of claim 1, wherein the generated routes are topological routes.

11. A computer program embedded in a readable medium, the computer program for specifying routes for a group of nets, the computer program comprising:

a) a first set of instructions for specifying a total cost;

b) a second set of instructions for performing a depth-first search to identify, for the group of nets, a complete routing solution that has a cost that does not exceed the total cost, wherein a routing solution for a set of nets includes a route for each net in the set;

c) a third set of instructions for incrementing the total cost if the search cannot find the complete routing solution, and performing another depth-first search to identify a complete routing solution for the group of nets that has a cost that does not exceed the

incremented total cost.

12.   The computer readable medium of claim 11, wherein the second set of instructions comprises:

a)   a fourth set of instructions for identifying a first set of routes for a first net in the group, wherein each route has a cost;

b)   a fifth set of instructions for individually examining the first-set routes until the complete routing solution is identified or until all first-set routes have been examined without identifying the complete routing solution;

d)   wherein the fifth set of instructions includes a sixth set of instructions for determining whether, in the region with the particular route embedded, a first partial routing solution for the nets other than the first net exists such that the cost of the particular route plus the first partial solution does not exceed the total cost.

13.   The computer readable medium of claim 12, wherein the computer program further comprises:

when a first partial routing solution exists for a particular first-set route, a seventh set of instructions for identifying the particular first-set route and the routes of the first partial routing solution as the complete routing solution.

14.   The computer readable medium of claim 13, wherein the sixth set of instructions comprises:

a)   an eight set of instructions for identifying a second set of routes for a

second net in the group in the region with the particular first-set route embedded;

b)   a ninth set of instructions for individually examining the second-set routes until the complete routing solution is identified or until all second-set routes have been examined without identifying the complete routing solution;

c)   wherein the ninth set of instructions includes a tenth set of instructions for determining whether, in the region with the particular first-set route and the particular second-set route embedded, a second partial routing solution for the nets other than the first and second nets exists such that the cost of the particular first-set and second-set routes plus the second partial solution does not exceed the total cost.

15.   The computer readable medium of claim 12, wherein when no second partial routing solution exists for any second-set route, the computer program examines another first-set route.

16.   The computer readable medium of claim 12, wherein the sixth set of instructions individually examines the first-set routes until the complete routing solution is identified or until all first-set routes have been examined without identifying the complete routing solution or until a particular number of routes have been examined.

17.   The computer readable medium of claim 11, wherein the generated routes are topological routes.

18.   A method of routing a group of nets within a region, the method comprising:

a)   generating a first set of routes for a first net in the region;

b)   selecting a first route from the first set of routes;

c)   generating a second set of routes for a second net in the region when the region contains the first route;

d)   determining whether any of the generated second-set routes for the second net can be embedded for an acceptable cost in the region that contains the first route for the first net;

e)   when none of the second-set routes can be embedded for an acceptable cost in the region that contains the first route,

selecting a second route from the first set of routes;

generating a third set of routes for the second net in the region when the region contains the second route; and

determining whether any of the generated third-set routes for the second net can be embedded in the region that contains the second route for the first net.

19.   The method of claim 18, further comprising embedding in the region the first route before generating the second-set routes for the second net.

20.   The method of claim 19, wherein when none of the second-set routes can be embedded in the region that contains the embedded first route, the method further comprising:

a)   removing the first route from the region;

b)   embedding the second route of the first net in the region.

21.   The method of claim 18, wherein determining whether any of the generated second-set routes can be embedded in the region that contains the first route comprises examining the second net's generated routes in the order of the quality of the second net's generated routes.

22.   The method of claim 18, wherein when the method determines that a particular route for the second net can be embedded in the region that contains a particular route of the first net, the method further comprising:

        a)   generating a plurality of routes for a third net in the region when the region contains the particular routes of the first and second nets;

        b)   determining whether any of the generated routes for the third net can be embedded in the region that contains the particular routes for the first and second nets.

23.   The method of claim 18, wherein the generated routes are topological routes.